



EFFECT OF SPRAYING WITH AN EXTRACT OF ROSELLE AND SALICYLIC ACID ON THE CHEMICAL PROPERTIES OF TWO GREEN ONION CULTIVARS (*ALLIUM CEPA* L.)

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Abstract:

A field experiment was conducted during the winter agricultural season -2022 Agricultural Research Station of the College of Agriculture / University of 2023 Basrah in order to study spraying with ,Karma Ali , Roselle extract and salicylic acid and the interaction between them in the vegetative characteristics of two varieties of green onions.

The experiment included two factors, two varieties of onions (local white and local red) and seven concentrations of spraying three with roselle ,extract which are (20, 10, 5) g. L⁻¹ and three with salicylic acid (100, 150, 200) mg. L⁻¹ in addition to the metering treatment And by three sprays between one spray and another 10 days. It was carried out as a one-time split factorial experiment according to the randomized complete block design with three replications, and the medium means of the treatments were compared using the least significant difference at the level of probability 0.05. and root compared to the local red onion , except for the number of leaves and leaf area, there is no difference between the two cultivars, and the plants that were sprayed withroselle extract ,at a concentration of 10 mg excelled. L⁻¹ In the above-mentioned traits experience shows that the interaction between the two study factors was significant

Keywords:green salicylic acid - onions -Roselle - extract

Introduction

Onion (*Allium cepa* L.) is one of the most important plants of the Alliaceae family, and it is one of the strategic crops in the world and plays an important role in human nutrition. The nutritional value of onions is represented in the fact that it contains sugars, proteins, calcium salts, potassium, phosphorus, iron, zinc, and others, as well as vitamins A, B1, B2, and B6. (Tutova *et al.*, 2022), and from a medical point of view, onions are used to treat cough, asthma, bronchitis, and to prevent neurological diseases and cardiovascular diseases by containing anthocyanins and flavonoids that act as antioxidants, in addition to containing the active substance Allicin, which is responsible for most the healing properties that the plant possesses (Ani *et al.*, 2021).

Its production rate is Green onions are important crops globally, but in Iraq they are grown in a very limited manner still low compared to global production, as the cultivated area for the year 2020 amounted to about 3300 hectares, with a productivity of 12.39 tons hectare⁻¹, while Egypt's production reached 18.91 tons hectare⁻¹ and the UAE 26.39 tons

The Arab Agricultural Statistics Yearbook, 2021) tons hectares⁻¹ and Jordan 16.65 · hectare⁻¹

Plant extracts are important in the germination, growth and nutrition of many different plant species. Among these which is an important source of vitamins, amino acids and many nutrients such ,*Hibiscus sabdorriffa* plant extracts is ,The acidic taste of the kiwi extract is due to the fact that it contains a group of organic acidsP. And Ca. andMg ,K as works to stimulate physiological processes such as Hibiscus acid andascorbic acid the most important of which are (Al-Hashimi, 2012). photosynthesis, chlorophyll formation, and cell division

Salicylic acid is acid is one of the plant hormones that have physiological roles in the growth and flowering of plants also has important and the absorption of ions, as it affects the movement of stomata and the production of ethylene. It physiological roles in plant growth, nutrient absorption, hormonal balance, and influencing the formation of)chlorophyll pigments and carotene Abdul albbas, 2021). Salicylic acid It is considered a non-enzymatic antioxidant produced industrially from a wide range of plant phenols. It is a compound that is generally considered safe for the environment

and human health. When sprayed on the shoots of plants, it improves plant growth and increases its productivity by increasing chlorophyll and the content of elements such as nitrogen in the southern region. This experiment was conducted due to the importance of the onion plant and the lack of studies that dealt with the effect of salicylic acid and rose extract on the green onion plant. In order to determine the best variety of green onion plant suitable for cultivation in the southern regions, this study was carried out.

MATERIALS AND METHODS

The field experiment was carried out during the winter agricultural season 2022-2023 at the Agricultural Research Station, Basrah. Soil samples were taken randomly from different places of the field soil at a depth of 30 cm, mixed well, then dried under the sun, smoothed and passed through a sieve with holes 2 mm, and samples were taken from the irrigation water and physical and chemical analyzes were conducted. Table (1) shows some physical and chemical characteristics of the soil and irrigation water.

Randomized complete block, designed as a factorial experiment, split for one time was used split plot design, with two factors only, two varieties of onions (local white and local red), and seven concentrations of spraying, three with Rose extract and three with salicylic acid, in addition to the comparison treatment, where the varieties were considered the factor.

Table (1) Some physical and chemical properties of soil and irrigation water for the growing season 2022-2023

Soil properties		Value	Unity
Degree of interaction (pH)		7.60	-
Electrical conductivity (EC)		6.55	ds m ⁻¹
Dissolved positive ions	Ca ⁺²	22.16	mmo l ⁻¹
	Mg ⁺²	27.80	mmo l ⁻¹
	Na ⁺	2.02	mmo l ⁻¹
	K ⁺	1.11	mmo l ⁻¹
Organic matter		2.63	%
Dissolved negative ions	HCO ₃	26.20	mmo l ⁻¹
	CO ₃	--	mmo l ⁻¹
	SO ₄ ⁻²	20.25	mmo l ⁻¹
	Cl ⁻	6.56	mmo l ⁻¹
Soil arthropods	Sand	11.22	%
	Green	43.72	%
	Mud	45.06	%
Weaving		Alluvial clay	-
Humidity at field capacity		28.15	%
Characteristics of irrigation water			
The degree of soil reaction (pH)		7.20	
Degree of electrical conductivity (EC)		4.2	ds m ⁻¹

/ The analysis was done in the central laboratory / College of Agriculture *Basrah University

The main plot and the secondary factor spraying sub plot with three replicates for each treatment, so that the number of experimental units is (2×7×3), thus the number of experimental units is 42 experimental units, the results were analyzed statistically using the statistical analysis program SPSS (Statistical package for social sciences). The mean of the treatments was compared using the least significant difference test (LSD) at a probability level of 0.05 (Al-Rawi and Khalafallah, 1980).

The field soil was prepared by plowing it twice orthogonally, smoothing it, leveling it, and planning it. The land was divided into three sectors, each sector consisting of two lines. The length of the line is (21) m, and the distance between the two lines is (75) cm. The line was excavated at a depth of (30) cm and filled first with a cement (Sifted sand) to a distance of (20) cm, and a layer of decomposed animal manure was added over it at a rate of (10) m³ Dunum⁻¹. and the DabNPK compound fertilizer was added to it (20-20-20) at a rate of 40 cm³ hectare t⁻¹. (Mattalab et al) then the excavations were leveled with the surface of the soil, and bitumen was added at a rate of 5 kg. Line⁻¹, (1989) and drippers were extended and covered with black nylon. Mulching, each line was divided into (7) experimental units, the length of the unit is (3) m, after which the plants sockets were determined with a distance of 10 cm between one socket and the other alternately on both sides of the line so that the number of plants in the experimental unit was 60 plants. The land was irrigated two days before planting the hatchlings to moisten the soil. The damaged and infected hatchlings were sorted and their weights were unified to approximately (1.5) grams (required). et al., 1989), Al-Fasqa

STUDIED TRAITS

The vegetative and root growth readings were taken at the end of the season, 120 days after planting, and 5 plants were randomly selected from each experimental unit, then according to the average per plant. The readings included

1. Plant height (cm)

Plant height was measured by measuring tape from the soil surface to the tallest leaf of the plant.

2. The number of leaves. Plant⁻¹

The number of tube blades whose height exceeded 5 cm was calculated and very short blades were left, then the average was extracted from each treatment

3. The leaf area of the plant(dm²)

Leaf area was calculated by applying a special formula for tubular onion leaves Gamiely (et al., 1991)

$$\text{The area of one leaf is } \text{cm}^2 = 93.1 + 1.83 \times$$

circumference of the leaf (at a distance of 25% from its base. The length x 38.6 distance of 25% from the base of the leaf were measured by a measuring tape for five leaves of the selected plants, then the average was taken For one leaf, the area of one leaf (cm²) was extracted according to the above equation, and then the following equation: the leaf area of the plant was extracted according to

$$\text{the number of leaves per plant} \times \frac{(2\text{cm})\text{unit per leaf area}}{100} = \text{Leaf area of the plant (dm}^2\text{)}$$

4. Soft weight of the vegetative total (gm.plant⁻¹)

The soft weight of the shoots (leaves and petioles of bulbs) was estimated after separating them from the bulbs after harvesting, washing them from the dust, and then weighing them using a sensitive balance

5. Fresh weight of the root system (gm)

The fresh weight of the root system was determined after extracting the plants with care to avoid tearing the roots then they were separated from the plant, cleaned well and weighed with a sensitive scale

6. Dry weight of shoots(gm.plant⁻¹)

The dry weight of the shoot (leaves and bulb petioles) was estimated after taking the fresh weight for each experimental unit. The samples were placed in paper bags and placed in an electric oven (Oven) at a temperature of 70 ° for a period of 72 hours. They were weighed several times until the weight was confirmed using a sensitive balance.

7. Dry weight of the root system (gm)

The dry weight of the root system was estimated by placing the roots in paper bags and placing them in an electric oven at a temperature of 70 ° for 72 hours, and weighing them using a sensitive balance.

Results and discussion

study shows that the two factors and the interaction between them had a significant effect on plant height, as the local red cultivar outperformed the local white cultivar, with an increase of 1.99%

The table also shows that the spraying treatments had a significant effect on plant height, especially the spraying extract 10 gm.l⁻¹), which showed a significant increase compared to the control treatment and roselle) treatment other spraying treatments, with an increase rate of (13.25 , 3.63 , 8.69) . , 62.8 , 8.12 , 7.85 % (respectively) mg l⁻¹ , salicylic 150 salicylic , mg.l⁻¹ 100 salicylic , extract 20 gm L⁻¹ roselle , extract 5 gm L⁻¹ roselle , compared to treatment. mg.l⁻¹), and all spray treatments showed a significant increase compared to the control 200 extract 10 gm L⁻¹) gave the highest height of 76.89 cm, compared to the lowest height of 65.25 roselle + white local) cm in the (local white + comparison) treatment. Table (3) shows that the cultivar factor did not significantly affect number of leaves in the plant. the

The table also shows that the spraying treatments had a significant effect on the number of leaves in the plant, especially extract 10 gm.l⁻¹), which showed a significant increase compared to the control roselle) the spraying treatment treatment and other spraying treatments, with an increase rate of (12.36, 47.36, 17.22, 34.59, 18.52). , 36.30% extract 20g. liter⁻¹ , Salicylic 100 mg. liter⁻¹ , Salicylic roselle , gm. L⁻¹ 5 roselle (respectively) compared to the extract of spraying treatments showed a significant increase compared to the. mg. L⁻¹) and all other 200 salicylic ,mg. L⁻¹ 150 control treatment

+ As for the interaction between the two factors of the study, it was significant, as the treatment (local white roselle extract 10 gm.l⁻¹) gave the highest rate of 18.33, compared to the lowest rate for leaves, which was 12.13 in the treatment (local white + comparison)

plant. Table (4) shows that the cultivar factor did not significantly affect the leaf area of the The table also shows that the spraying treatments had a significant effect on the leafy area of the plant, especially the extract concentration (10 g. L⁻¹), as it showed a significant increase compared to roselle treatment of spraying with the control treatment and other spraying treatments, with an increase rate of (64.08, 10.58, 9.37, 47.47, (24.32, 39.71 salicylic , mg L⁻¹ 100 salicylic , extract 20 gm Lt⁻¹ roselle , extract 5 gm Lt⁻¹ roselle , respectively, for comparison , (% treatments showed a significant increase compared to the control. mg L⁻¹ All other spraying 200 salicylic , mg L⁻¹ 150 treatment

As for the interaction between the two factors of the study, it was significant, as the treatment (local white + kraut extract 10 gm.l⁻¹) gave the largest paper area amounted to 53.71 dm² compared to the lowest paper area in the treatment which amounted to 30.96 dm². ,(local red + comparison)

Table (5) shows that the two factors of the study and the interaction between them had a significant effect on the fresh weight of the vegetation, as the local white cultivar outperformed the local red cultivar, with an increase of %17.92.

The table also shows that the spraying treatments had a significant effect on the fresh weight of the vegetative total of the plant, especially the treatment (Kujarat extract 10 gm L⁻¹), as it showed a significant increase compared to the comparison treatment and other spraying treatments, with an increase rate of (0.08, 24.06, 53.80, 46.76, 41.35), respectively (compared to, (% 27.62) roselle extract 5 gm.l⁻¹ roselle, extract 20 gm.l⁻¹ salicylic, mg.l⁻¹ 100 salicylic, mg.l⁻¹ 150 salicylic mg.l⁻¹) All other spraying treatments showed a significant increase compared to 200 the control treatment

As for the interaction between the two factors of the study, it was significant, as the treatment was superior (local white +roselle extract 10 g.l⁻¹), as it gave 152.39 gm fresh weight of the shoot of green onion, compared to the lowest fresh weight of the shoot in the treatment (local red + comparison.) as it gave 80.15 g.

Table (2) the effect of the variety, spraying coefficients and the overlap between them on the plant height (cm) of a green onion plant

Experience coefficients		Influence of varieties		Average spray effect
		Local white	Local Red	
The effect of spray coefficients	Comparative treatment	65.26	67.44	66.35
	Roselle extract 5GM L ⁻¹	73.50	71.52	72.51
	Roselle extract 10GM L ⁻¹	76.89	73.40	75.14
	Roselle extract 20GM L ⁻¹	66.84	71.43	69.13
	Salicylic acid 100 Mg l ⁻¹	69.39	68.98	69.18
	Salicylic acid 150 Mg l ⁻¹	67.57	71.43	69.50
	Salicylic acid 200 Mg l ⁻¹	67.18	72.16	69.67
Average effect of varieties		69.52	70.91	
(L.S.D) 0.05		Species	Spraying	Interference
		0.54	1.01	1.42

Table (3) the effect of the variety, spraying coefficients and the overlap between them in Number of leaves (plant⁻¹) For the green onion plant

Experience coefficients	Influence of varieties	
		Local Red

		Local white		Average spray effect
The effect of spray coefficients	Comparative treatment	12.13	12.33	12.33
	Roselle extract 5GM L ⁻¹	15.33	17.00	16.17
	Roselle extract 10GM L ⁻¹	18.33	18.00	18.17
	Roselle extract 20GM L ⁻¹	16.33	14.67	15.50
	Salicylic acid 100 Mg l ⁻¹	14.33	12.67	13.50
	Salicylic acid 150 Mg l ⁻¹	15.67	15.00	15.33
	Salicylic acid 200 Mg l ⁻¹	12.33	14.33	13.33
Average effect of varieties		14.95	14.86	
(L.S.D) 0.05		Species	Spraying	Interference
		0.59	1.10	1.56

Table (4) the effect of the variety, spraying coefficients and the overlap between them in the paper space (creamy2) For the onion plant

Experience coefficients		Influence of varieties		Average spray effect
		Local white	Local Red	
The effect of spray coefficients	Comparative treatment	32.47	30.96	31.71
	Roselle extract 5GM L ⁻¹	44.63	49.47	47.05
	Roselle extract 10GM L ⁻¹	53.71	50.35	52.03

	Roselle extract 20GM L ⁻¹	50.71	44.46	47.59
	Salicylic acid 100 Mg l ⁻¹	38.31	32.26	35.28
	Salicylic acid 150 Mg l ⁻¹	43.64	40.05	41.85
	Salicylic acid 200 Mg l ⁻¹	34.54	39.95	37.24
Average effect of varieties		42.57	41.07	
(L.S.D) 0.05	Species		Spraying	Interference
		1.82	3.39	4.80

Table (5) the influence of the variety, spraying coefficients and their overlap in the soft weight of the vegetative aggregate (G). Flora-1) For the green onion plant

Experience coefficients	Influence of varieties		Average spray effect	
	Local white	Local Red		
The effect of spray coefficients	Comparative treatment	92.86	80.15	86.50
	Roselle extract 5GM L ⁻¹	114.09	100.36	107.23
	Roselle extract 10GM L ⁻¹	152.39	113.68	133.04
	Roselle extract 20GM L ⁻¹	147.25	116.71	131.98
	Salicylic acid 100 Mg l ⁻¹	89.51	91.80	90.65

	Salicylic acid 150 Mg l⁻¹	99.22	89.02	94.12
	Salicylic acid 200 Mg l⁻¹	113.93	94.54	104.24
Average effect of varieties		115.61	98.04	
(L.S.D) 0.05		Species	Spraying	Interference
		1.89	3.54	4.99

The table (6) shows the two factors of the study and the overlap between them have a significant impact on the dry weight of the vegetable total, the local white Variety has surpassed the other variety with an increase of 13.30%. The table also shows that the spraying coefficients significantly affected the dry weight of the vegetative aggregate of the plant, especially the spraying treatment (extract in 10 g g. L⁻¹ Where it showed a significant increase compared to the comparison transaction and other transactions and with an increase of (118.96 41.75, 59.61, 93.50, 1.25, 31.54,) % respectively (compare, the extract as 5 g. L⁻¹, Extracted as 20 g.L⁻¹, Salicylic 100 mg. L⁻¹, Salicylic 150 mg. L⁻¹, Salicylic 200 mg. L⁻¹) And all other spraying coefficients showed a significant increase compared to the comparison coefficient.

As for the overlap between the two study factors, it was significant as the treatment of (local white + extract as 10 g) was superior. L⁻¹) And gave 49.20 g dry weight compared to the lowest dry weight in the treatment (local Red + comparative) amounted to 18.56 g.

The (7) table shows the two factors of the study and the overlap between them have a significant impact on the soft weight of the total root, the local white variety surpassed the local red variety with an increase of 7.46%.

The table also shows that the spraying coefficients significantly affected the soft weight of the total radical, especially the spraying treatment (extract in 20 g. L⁻¹), Where it showed a significant increase compared to the comparison transaction and other transactions and with an increase of (52.61 21.33, 34.84, 50.00, 3.48, 11.98,) % respectively (compare, the extract as 5 g.L⁻¹, Extracted as 10 g.L⁻¹, Salicylic 100 mg.L⁻¹, Salicylic 150 mg.L⁻¹, Salicylic 200 mg.L⁻¹), And all other spraying coefficients showed a significant increase compared to the comparison coefficient.

As for the overlap between the two study factors, it was significant as the treatment of (local white + extract as 20 g) was superior. L⁻¹), Where it gave 6.63 g soft weight for the radical sum compared to the lowest soft weight for the radical sum was in the treatment (local Red + comparison), giving 3.08 G.

The table (8) shows the two factors of the study and the overlap between them have a significant effect on the dry weight of the total root, the local white Variety has surpassed the other variety with an increase of 2.74%

The table also shows that the spraying coefficients had a significant impact on the dry weight of the total radical, especially the spraying treatment (Extract in 20 g. L⁻¹), Showing a moral increase amounting to (35.48 2.44, 7.69, 15.07, 16.67, 25.37,)% respectively (compare, the extract as 5 g.l⁻¹, Extract in 10 g.L⁻¹, Salicylic 100 mg.L⁻¹, Salicylic 150 mg.L⁻¹, Salicylic 200 mg.L⁻¹) And all other spraying coefficients showed a significant increase compared to the comparison coefficient.

As for the overlap between the two study factors, it was significant as my treatment (local white + extract as 10 g) was superior. L⁻¹) And treatment (local Red + extract as 20 g jars. L⁻¹), Where it gave 0.84 g dry weight compared to the lowest radical dry weight was in the treatment (local Red + comparison), where it gave 0.59 g.

As for the effect of the Variety, the effect may be due to the difference of varieties in the genetic factors that carry them, which in turn affect the phenotypic traits, and the reason may be due to the suitability of environmental conditions in the region to one variety and not the other, which reflected positively on its phenotypic traits, and this is consistent with what (Costa et al.,2000) 9 Esho et al., 2003)9 ((Kushal et al., 2015) when studying the evaluation of onion varieties and found the presence of genetic diversity between varieties in the qualities of hereditary and vegetative growth.

As for the superiority of kratom extract, the reason is due to the fact that kratom extract contains nutrients and precursors for growth regulators, which all contribute to increasing the efficiency of transporting the products of carbon metabolism, the formation of chlorophyll, energy production, the construction of fatty and nucleic acids, and all this mainly leads to increased growth processes in the plant, and these results are consistent with (2015) Babilie et al., And (2023) Zeebaree et al.

Table (6) impact item and spray treatments and overlap between them in .Dry weight of shoots (g plant C⁻¹) of green onion plants

Experience coefficients		Influence of varieties		Average spray effect
		Local white	Local Red	
The effect of spray coefficients	Comparative treatment	24.13	18.56	21.35
	Roselle extract 5GM L ⁻¹	41.08	29.99	35.54
	Roselle extract 10GM L ⁻¹	49.20	44.30	46.75
	Roselle extract 20GM L ⁻¹	47.38	44.95	46.17
	Salicylic acid 100 Mg l ⁻¹	23.94	24.38	24.16
	Salicylic acid 150 Mg l ⁻¹	30.18	28.40	29.29
	Salicylic acid 200 Mg l ⁻¹	35.02	30.93	32.98
Average effect of varieties		35.85	31.64	
(L.S.D) 0.05		Species	Spraying	Interference
		1.34	2.51	3.55

Table (7) impact item and spray treatments and overlap between them in Fresh weight of root system (g. plant⁻¹) of green onion plant

Experience coefficients		Influence of varieties		Average spray effect
		Local white	Local Red	
The effect of spray coefficients	Comparative treatment	4.19	3.08	3.63
	Roselle extract 5GM L ⁻¹	6.07	5.61	5.84
	Roselle extract 10GM L ⁻¹	6.21	6.43	6.32
	Roselle extract 20GM L ⁻¹	6.63	6.44	6.54
	Salicylic acid 100 Mg l ⁻¹	4.89	3.84	4.36
	Salicylic acid 150 Mg l ⁻¹	4.85	4.86	4.85
	Salicylic acid 200 Mg l ⁻¹	5.46	5.34	5.39
Average effect of varieties		5.47	5.09	
(L.S.D) 0.05		Species	Spraying	Interference
		0.22	0.41	0.59

Table (8) the effect of the variety, spraying coefficients and their overlap in the dry weight of the root aggregate (G). Flora⁻¹) For the green onion plant

Experience coefficients		Influence of varieties		Average spray effect
		Local white	Local Red	
The effect of spray coefficients	Comparative treatment	0.65	0.59	0.62
	Roselle extract 5GM L ⁻¹	0.79	0.78	0.78
	Roselle extract 10GM L ⁻¹	0.81	0.84	0.82
	Roselle extract 20GM L ⁻¹	0.82	0.84	0.83
	Salicylic acid 100 Mg l ⁻¹	0.71	0.63	0.67
	Salicylic acid 150 Mg l ⁻¹	0.73	0.70	0.72
	Salicylic acid 200 Mg l ⁻¹	0.75	0.72	0.73
Average effect of varieties		0.75	0.73	
(L.S.D) 0.05		Species	Spraying	Interference
		0.01	0.02	0.03

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